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24h

ATTN:

Chief, Procurement Division/LO
Chief, Contracts Branch

2 April 1954

Chief, Engineering Division/CC

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RR-11AA Development Contract Proposal

REFERENCE : Specification No. 54-A-1028-A and Specification No. 54-A-1028-A-T
dated 29 March 1954

1. The Office of Communications has a requirement for the development of a miniature transistor receiver covering the frequency range of 3 to 12 megacycles. This equipment has been designated the RR-11AA and is described by Specification Nos. 54-A-1028-A and 54-A-1028-A-T.

2. We desire to give several interested and capable manufacturers an opportunity to submit proposals for the development of this equipment. The following manufacturers are recommended:

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3. It is requested that proposals be solicited from each of the manufacturers listed above. Attached for this purpose are 10 copies of the referenced specifications. Information as to deliverable items and information required from the contractor in submitting the proposal is shown on Attachment A. Proposal invitations should request conferences between the company and government engineers and representatives of the contracting officer prior to the submission of proposals. Funds from FY-1954 for this development are available and the allotment number will be supplied you upon our acceptance of one of the proposals. In order that we may be able to negotiate this contract with our available funds, it is necessary that we receive the proposals at least 30 days prior to the date by which you will require our request for contractual negotiations which will utilize FY-1954 funds.

4. The specifications, equipment, bill of materials and associated drawings shall be unclassified; however, the association with the Agency should bear the classification of SECRET.

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OC-E/R&D-EF/JCB/mb 2 April 1954

Attachment: Attachment "A"

cc: ✓ Contract RR-11AA 10 copies of Specification No. 54-A-1028-A
Reading 10 copies of Specification No. 54-A-1028-A-T
C&RS/LO - ☐
Chrono
Dev-ep

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SPECIFICATION No. 54-A-1028-A-T

RR-11AA Development Test Specifications

29 March 1954

1. GENERAL

This specification shall be a part of Specification 54-A-1028-A for the development of the RR-11AA Communications Receiver.

1.1. Purpose of this Specification

This specification shall outline the test procedure to be conducted on completed prototypes. Necessary test equipment is itemized (exclusive of transistor test equipment), test methods are described and the test requirements are presented.

1.2. Submittal of Test Data

Test data shall be submitted simultaneously with the delivery of prototype models.

1.3. Test Equipment

The following principal test equipment is necessary to conduct prototype tests:

1.3.1. Frequency Secondary Standard

Military BC 221, or equivalent.
General Radio Frequency Meter Model LR-3 (Model 271).

1.3.2. R. F. Signal Generators

Measurement Corporations Model 65-B, or equivalent.
Measurement Corporations Model 90, or equivalent.

1.3.3. Audio Output Power Meter

General Radio Model 583-A.

1.3.4. A. C. Vacuum Tube Voltmeter

Hewlett Packard Model 400-C.

1.3.5. R. F. Bridge

General Radio Model No. 916-A, or equivalent.

1.3.6. Audio Signal Generator

Hewlett Packard Model 200-B or 200-C, or equivalent.

1.3.7. A. M. Communications Receiver

Any type (s) capable of covering the frequency range of from 15 kilocycles to 220 megacycles.

2. TEST DATA

2.1. Life Tests

The requirements of Section 3 of this Specification are based upon the use of fresh batteries. Test data required by Section 3 shall also be obtained for battery voltages representative of those obtainable after 100 hours, and after 150 hours of receiver operation.

2.2. Temperature Tests

It shall be contingent upon the contractor to devise test methods and submit test data for equipment operation and storage under the requirements of Section 5.3. of the RR-11AA Development Specifications.

3. TESTS

3.1. Frequency Test Points

RR-11AA Tests, unless otherwise indicated, shall be made at 3, 4, 6, 8, 10 and 12 megacycles except that should band switching be employed in the design of the equipment, such tests shall be made at the high and low ends, and the center of each band.

3.1.1. Center Frequency Test Points

In such cases where but a single frequency test point is indicated this shall be so only if band switching is not employed. Should band switching be employed the frequency test point shall be the center of each band.

3.2. RR-11AA Receiver

3.2.1. Antenna Input Impedance

Method of Test:

- a. Receiver on and tuned to the measuring frequency.
- b. Controls set to maximum.
- c. Measurement made with an R. F. Bridge.

Requirement:

Input impedance shall be 300 ohms \pm 100 ohms.

3.2.2.

Calibration Accuracy

Method of Test:

- a. Receiver on and tuned to the measuring frequency.
- b. R.F. signal generator modulated 30% at 1000 c.p.s. tuned to the receiver as determined by maximum audio power output.
- c. Determine the frequency of the signal generator with a secondary frequency standard.
- d. The difference between the receiver dial setting and the secondary frequency standard shall determine the calibration accuracy in c.p.s. for percent calculation against the tuned frequency.

Requirement:

The dial calibration shall be within 0.1% of the tuned frequency.

3.2.3.

Tuning Resetability

Method of Test:

- a. Receiver on and the frequency dial graduation is approached in a clockwise direction.
- b. An R.F. signal generator modulated 30% at 1000 c.p.s. tuned to the receiver as determined by maximum audio power output.
- c. Determine the frequency of the signal generator with a secondary frequency standard.
- d. Approach the same frequency dial graduation in a counter-clockwise direction and repeat steps b and c.
- e. The difference in the two secondary standard readings shall determine the resetability error in c.p.s. for percent calculation against the tuned frequency.

Requirement:

The accuracy of dial resetability shall be within 0.01% throughout the tuning range.

3.2.4.

Receiver Sensitivity

3.2.4.1.

A. M.

Method of Test:

- a. Receiver on and tuned to the measuring frequency, BFO off, and gain controls at maximum.

3.2.4.1.

A. M. - Method of Test - Cont'd

- b. The receiver input is connected to the R.F. signal generator modulated 30% at 1000 c.p.s. through a 300 ohm dummy load and the output terminated in an audio output power meter (4000 ohms).
- c. Tune the signal generator to the receiver and adjust the R.F. input to establish a 1.0 milliwatt noise plus signal output.

Requirement:

The R.F. input voltage shall not exceed 15 microvolts for a 0.5 milliwatt output.

3.2.4.2.

C. W.

Method of Test:

- a. Receiver on and tuned to the measuring frequency, BFO tuned to 1000 c.p.s., and gain controls at maximum.
- b. The receiver input is connected to the R.F. signal generator through a 300 ohm dummy load and the output terminated in an audio output power meter (4000).
- c. Tune the signal generator to the receiver and adjust the R.F. input to establish a 0.5 milliwatt noise plus signal output.

Requirement:

The R.F. input voltage shall not exceed 5 microvolts for a 0.5 milliwatt output.

3.2.5.

Raw Noise

Method of Test:

- a. The antenna shall be terminated into 300 ohms and the audio output terminated in an audio power output meter (4000 ohms).
- b. Receiver on and control set to maximum. The BFO shall be off for the A.M. test and adjusted for maximum noise output for C.W. measurements.

Requirement:

C.W. or A.M. raw noise output shall not exceed 0.02 milliwatts.

3.2.6.

Image Rejection

Method of Test:

- a. Measure the receiver A.M. sensitivity at the high end of the band (s).
- b. Re-tune the signal generator to the receiver frequency plus twice the I.F.
- c. Re-measure the receiver sensitivity A.M. at this image frequency.
- d. The image rejection in decibels shall be calculated from the ratio of the two sensitivity measurements obtained in a and c.

Requirement:

The image rejection shall be 30 decibels or greater.

3.2.7.

I. F. Rejection

Method of Test:

- a. Measure the receiver A.M. sensitivity at the low end of the band (s).
- b. Re-tune the signal generator to the intermediate frequency.
- c. Re-measure the receiver A.M. sensitivity at the I.F. frequency.
- d. The I.F. rejection in decibels shall be calculated using the ratio of the two sensitivity measurements obtained in a and c.

Requirement:

The I.F. rejection shall be not less than 60 decibels.

3.2.8.

Overall Selectivity

Method of Test:

- a. Overall selectivity measurements shall be made at the approximate center of the band (s). The BFO off and gain controls at maximum.
- b. The R.F. signal generator modulated 30% at 400 c.p.s. shall be tuned to the center frequency and the microvolt input and milliwatt output recorded as the reference level.
- c. Increase the R.F. input signal 3 decibels.
- d. Detune the R.F. signal generator each side of the center frequency until the audio power output decreases to the reference level.

3.2.8.

Overall Selectivity - Cont'd

- e. Measure the frequency of the R.F. signal generator with a secondary frequency standard and record.
- f. Increase the R.F. microvolt input in steps of 6, 10, 20, 40, and 60 decibels above the reference input level and repeat steps d and e for each step.

Requirement:

Overall Selectivity shall approximate the following:

Response (Decibels)	Bandwidth (Kilocycles)
- 3	5.0
- 6	5.4
-10	6.2
-20	7.8
-40	11.2
-60	16.0

3.2.9.

Audio Response

Method of Test:

- a. The receiver shall be connected to an R.F. signal generator modulated 30% at a variable frequency using a standard dummy antenna. The output shall be terminated in an audio power output meter (4000 ohms).
- b. The R.F. microvolt input shall be adjusted for 0.5 milliwatt output at 1000 c.p.s.
- c. The modulating frequency shall be varied between 150 and 7000 c.p.s. and the power recorded at 100, 150, 200, 400, 700, 1000, 1500, 2000, 2500, 4000 and 7000 c.p.s.

Requirement:

The audio response shall be essentially flat and not fall below 3 decibels over the range of 150 to 2500 c.p.s.

3.2.10.

Overall Stability

3.2.10.1.

Thermal

Method of Test:

- a. The receiver on and tuned to the middle of the band (s), BFO on, and gain controls at maximum.

3.2.10.1. Thermal - Cont'd.

- b. A secondary frequency standard shall be loosely coupled and tuned for zero beat with the receiver. The frequency is recorded.
- c. Repeat step b at five minute intervals to obtain 12 consecutive readings.
- d. Plot a curve of percent frequency change versus time.
- e. Local oscillator drift shall not be compensated for by introducing drift into the BFO.

Requirement:

After a five minute warm-up, the rate of change of frequency shall not exceed .0004% per. minute.

3.2.10.2. Mechanical Shock (Jarring)

Method of Test:

- a. The receiver shall be on and tuned to the measuring frequency, BFO on and gain controls at maximum.
- b. A secondary frequency standard shall be loosely coupled and tuned to zero beat with the receiver.
- c. The receiver shall then be tilted to a 45 degree angle from the surface of the bench, the rear lower edge of the receiver case serving as the fulcrum. A free fall drop shall be executed from this position, and the secondary frequency standard brought to zero beat with the receiver.

Requirement:

Frequency shift shall not exceed .0004% due to mechanical shock.

3.2.10.3. Hand Capacity

Method of Test:

- a. The receiver on and tuned to the measuring frequency, BFO on and gain controls at maximum.
- b. A secondary frequency standard shall be loosely coupled and tuned for zero beat with the receiver.
- c. The receiver shall be picked up and handled.

Requirement:

There shall be no evidence of frequency drift due to hand capacity.

3.2.11.

Receiver Radiated Interference

Method of Test:

- a. Receiver radiated interference tests shall be made in accordance with MIL-I-16910(SHIPS) as amended. Figure 39 outlines the test procedure in the 15 kilocycle to 30 megacycle range and Figure 40 prescribes the measurement setup in the 30 to 200 megacycle range. For the RS-11AA tests, the upper range of Figure No. 40 shall be extended to 220 megacycles.
- b. Paragraph 4.5.1.4.10.2. of the above specification is herewith amended to read "Load. - The receiver input shall be terminated into 300 ohms."

Requirement:

- a. Paragraph 3.6.1.2.1. of MIL-I-16910(SHIPS) is herewith amended to read "Receiver Oscillator Radiation. - The RS-11AA receiver shall not exhibit any oscillator radiation in excess of 400 micromicrowatts when subjected to the receiver oscillator radiation test specified in paragraph 4.5.1.4. over the frequency range of 15 kilocycles to 220 megacycles."

3.2.12.

Spurious Response

3.2.12.1.

Internal

Method of Test:

- a. Receiver on, BFO on, and gain controls at maximum. The antenna terminated with a 300 ohm dummy load.
- b. The receiver shall be tuned over its frequency range.

Requirement:

There shall be no evidence of internal spurious responses.

3.2.12.2.

External

Method of Test:

- a. Receiver on, BFO on, and gain controls at maximum.
- b. A C.W. sensitivity measurement is made at the center of the band (a) and the microvolt input and power output recorded.
- c. Increase the R.F. signal generator output to 200,000 microvolts and tune the generator over its entire frequency range noting each spurious response other than at the image and intermediate frequencies.

3.2.12.2. External - Cont'd

- d. At each noted spurious response the signal generator microvolt output shall be adjusted to obtain the reference output. Record signal input.
- e. Spurious responses shall be calculated from steps b and d above.

Requirement:

Spurious response (external) shall be down 70 decibels.

3.2.13. Vibration

Method of Test:

- a. Vibration tests shall be conducted in accordance with Bureau of Ships Specification 40F9(SHIPS) paragraphs F-5b(2)a and F-5b(2)e.

Requirement:

- a. After exposure to the above tests, the RR-11AA receiver shall exhibit no evidence of mechanical breakdown or impairment effecting the operational characteristics of the equipment.

3.2.14. Drop Test

Method of Test:

- a. The equipment shall be dropped from a height of 36 inches to a solid oak surface. Six successive free fall drops shall be accomplished with the point of impact being four corners and two surfaces of the equipment case.

Requirement:

- a. Upon completion of the drop tests, the equipment shall exhibit no evidence of damage or impairment effecting the operational characteristics of the equipment.